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infrared mapping as a predictive tool in wound care

Aberrant wound healing, as observed in the presence of co-morbidities such as diabetes, represents a major clinical problem. To improve wound care, a better understanding of the cellular and molecular details of healing processes is required. Our aim was to utilize Synchrotron- and focal plane array (FPA)-based Fourier-transform infrared (FTIR) chemical mapping for further characterizing the wound healing process. Skin tissue samples were obtained from therapeutic debridement procedures over several weeks, from a chronic diabetic venous ulcer and a full-thickness burn with fully-informed patient consent. Normal tissue was obtained from murine skin samples. Sections (4 μ m) were mounted onto calcium fluoride windows and analysed at the Infrared beamline (Australian Synchrotron) by both Synchrotron- and FPA-based FTIR mapping. Microscopic analysis and visualization of heat maps generated by infrared imaging provide a distinctive view of the wound matrix. Analysis of intensities at appropriate wavelengths, highlight discrete patterns of lipid and protein composition in control and wound tissue in distinct cellular layers. Together, FPA-based imaging allows for a relatively large overview and Synchrotron-FTIR enables detailed spectral analysis at the single-cell level providing a clear illustration of the dynamic wound environment. Normal wound healing requires a well-organized and orchestrated series of molecular events involving numerous cell types. For example, haemostasis is mediated by platelets, endothelial cells form new blood vessels and fibroblasts deposit collagen. Overall, cell type analysis using Synchrotron- and FPA-based FTIR and correlation with conventional immunofluorescence studies, highlight the potential use of these technologies as diagnostic tools in wound care.

Keywords or phrases (comma separated)

FPA-FTIR, Synchrotron-FTIR, wond healing, diabetic wounds, inflammation

Are you a student?

No

Do you wish to take part in the Student Poster Slam?

No

Are you an ECR? (<5 yrs since PhD/Masters)

No

What is your gender?

Male

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